Mountaintop Mining/Valley Fill Environmental Impact Statement
Technical Study

WORK PLAN APPROACH FOR FLOODING

August 9, 1999

I. Problem Statement

A typical mountain-top mining/valley fill (MTM/VF) operation in the Appalachian coalfields removes overburden and inter-burden material to facilitate the extraction of low-sulfur coal seams--requiring placement of excess spoil into adjacent valleys. The mining and excess spoil disposal changes the land configuration, land cover, and drainage patterns from the pre-mining conditions. Concerns are expressed that these changes may affect runoff rates, leading to increased peak flows downstream. Increased peak flows might raise stream levels to flood stage.

This study will model the runoff characteristics before and after mining in streams below valley fills. An existing hydrologic modeling study by Phoenix Mining on the cumulative effects of mine sites in the Island Creek watershed with respect to flooding implications will be assessed.

II. Goals and Questions to be Addressed by This Work Plan

The steering committee for the Environmental Impact Statement (EIS) has adopted goals and questions to be addressed from several different perspectives: environmental, regulatory, and public service. This work plan, in conjunction with the other work plans and technical symposia that will be conducted during the preparation of the EIS, will attempt to address the following goals and questions, as adopted by the committee:

- The EIS will consider coordinated agency decision-making processes, guidelines, and policies as alternatives to the existing regulatory scheme. This will assure minimization of adverse effects to streams, fish, wildlife, and other environmental resources from mountaintop mining and associated excess spoil disposal (valley fills).

- What are the short- and long-term effects of individual mountaintop mining operations and associated valley fills on the following:

  a. physical, chemical and biological conditions of affected streams and their watersheds, both within the area of direct impact and downstream, and including surface and groundwater. Consider both water quality and quantity, including flooding potential and baseflow. Consider changes on aquatic habitat, and stream use.

  b. What are the cumulative short- and long-term effects of mountaintop mining

operations and associated valley fills on 1(a) and (b) above, when considered together with all other surface disturbing activities within given watersheds of varying size? The answer to this question should include a complete inventory of past and expected future stream and terrestrial area effects (i.e. miles of streams and square miles of terrestrial habitat impacted/lost.)

c. What are the relative individual and cumulative effects of a single large valley fill versus multiple small headwater fills on the receptors evaluated in (a) and (b) above? In answering this question, assess the relative value of headwaters and their contribution to the physical, chemical and biological health of the larger watershed.

d. After evaluating the combined effects of mining and other surface disturbing activities, and the offsetting effects of reclamation and compensatory mitigation, what are the expected net cumulative effects of existing, ongoing and all viable future mountaintop mining operations on the aquatic and terrestrial environments of the Appalachian coalfields region? What impacts will the future projections have on environmental resources, including waters of the U.S. and fish and wildlife?

III. EIS Team Members and Experts Consulted

OSM: Don Stump, ARCC; Danny Rahnema, Knoxville, TN Field Office
COE: Walt Leput, Mark Zaitsoff, Pittsburgh District

Experts consulted:

USGS: Jim Eychaner, Water Resources Division District Office, Charleston, WV
WVU: Henry Rauch

IV. Current Practices

The Surface Mining Control and Reclamation Act (SMCRA) led to regulations containing permitting, design, and construction monitoring requirements to implement state-of-the-art engineering and reclamation standards for surface-mined lands. The regulations and performance standards were tailored to ensure meeting the SMCRA goals for returning mined lands to pre-mining productive capability. Control of surface runoff to prevent erosion and sedimentation, maintenance of the hydrologic balance (water quality and quantity) are important component of the requirements governing mining and reclamation operations. Engineered diversions, roads and sediment control impoundments route and control water within a surface mining operation, allowing measurement and calculating the discharges leaving the mine site. This study will focus refined hydrologic modeling software to evaluate the peak flow conditions which could be anticipated before and after mining.

V. Study Approach

The Environmental Protection Agency, the Office of Surface Mining, the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service began a joint federal evaluation of the impacts and regulation of fill activities in the Appalachian region in early 1998 (termed the "Four Agency Studies"). The four agency studies covered several key issues. One of those issues was the individual and cumulative effects of valley fills and the associated mining disturbance on downstream flooding potential.

Due to the time constraints, and potential problems/expense with capturing actual storm data in the field, the option of using computer models to simulate flood peaks for design storms was chosen by the Federal agencies. These models were developed and calibrated based on actual data collected over many years in order to accurately predict and represent on-the-ground conditions resulting from different types of land disturbances. The models consider site conditions such as ground cover (or lack thereof), slopes, water travel time, infiltration, and other factors relevant to establishing peak runoff amounts at any given point in the watershed analyzed by the model. The computer modeling is done by the Pittsburgh District of the U.S. Army Corps of Engineers (COE) under an interagency agreement with OSM (Agreement number 143868-IA98-12244) finalized in September 1998.

The study uses HEC computer models to simulate storm hydrographs for various design storm events and various reclamation land cover types (e.g., trees versus grass). The models will be used to predict the impacts (flooding potential) of each storm event on the receiving stream, as well as the cumulative hydrologic impacts of more than one fill site on a second order tributary.

Three sites in West Virginia were selected by OSM for evaluation, with valley fills being constructed at each site. OSM and COE staff collected information from permit files and site visits. Data files and digital map files are created by the COE for computer model simulations. Storm hydrographs model conditions that represent before and after valley fill construction watershed scenarios. The COE will prepare reports summarizing the modeling for each site and the cumulative analysis of multiple fills is planned to be completed by the end of 1999.

OSM staff will additionally use the computer model SEDCAD 4 to evaluate the storm runoff peak flows for the three sites modeled by the COE. The SEDCAD modeling will use the same conditions as the COE study. This evaluation will provide a comparison of the surface water modeling software, SEDCAD, and the HEC software used by the COE. SEDCAD is frequently used by the coal industry to design their water and sediment control structures on coal mines.

OSM will work with the COE to evaluate surface water computer modeling recently submitted by Phoenix Coal Company as part of their permit application for the Island Creek watershed of West Virginia. This modeling evaluates the cumulative impacts of multiple operations in Island Creek during various phases of mining and reclamation.

The studies listed above are limited to computer modeling. Additional work is planned by other EIS teams (Fill Hydrology) that would collect real-time field data during precipitation events to document the actual peak flows for individual storms. Both types of studies are needed. The computer modeling can be used to simulate a wide variety of conditions for a study area. These computer outputs can then be compared to show similarities and differences. Real-time field data collection is constrained by the conditions in the study area and the size/types of storms that occur during the data collection period. The real-time data can be used both to document actual storm events and better calibrate the computer model to increase the confidence level and accuracy for the computer modeled peak flows.

VI. Projected Study Costs:

FY 98: $206,000
FY 99: $ 30,000

For further information regarding this Work Plan, please contact Mr. Donald Stump, Office of Surface Mining at (412) 937-2164, or e-mail dstump@osmre.gov.